LABOUR SUPPLY AMONG HOSPITAL PHYSICIANS

Time allocation among public hospital physicians after the hospital reform of 2002

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This thesis is based on a study that was initiated by Professor Terje P. Hagen and researcher Sølve Mikal Nerland, at the Institute of Health Management and Health Economics at the University of Oslo in 2001 and 2006. The aim of these two studies was to evaluate the effect of Activity Based Financing system in 1997 and the Hospital Reform of 2002.

The initial of this thesis was to do an analysis on time allocation among public hospital physicians in the period 2001 and 2006, based on data from these two surveys.

The process started in December when I asked Terje if I could write about some of the topics he had suggested for us students - which I could. The beginning of the whole writing process started eventually in January and it has been a long but instructive ride...

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ABSTRACT

Background: The intention of this study was to see if there have been any changes in the labour supply of hospital physicians after the implementation of the hospital reform in 2002. Several studies have shown that physicians spend less time on patient related work and that the productivity has decreased.

Methods: The data material in this thesis is based on second handed data. Two surveys were conducted in 2001 and 2006 on randomly collected hospital physicians by the Physician register. The total respondents were 1131 physicians in 2001 and 1298 physicians in 2006.

Results: Hospital physicians have decreased their total working time with approximately 1 hour in 2006. This may be due to a shifting trend in the society where people are valuing more leisure, and less working time. While decreasing the total working time, the hospital physicians have increased their amount of patient related work by approximately 3 % (1 hour) in 2006.

Conclusion: There have been modest changes in working time, with approximately 1 hour decrease in total working hours in 2006, and 1 approximately 1 hour more on patient related work in the same year. It can not be concluded that the hospital reform have had any effect on working hours and time allocation, but there are indications in the study that trends and tendencies towards more family life and leisure are influencing the labour supply among physicians.

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1. Introduction

1.1 Intro

The demand for health care in Norway is increasing and will continue to increase in the years to come due to an aging and more demanding population. In the health care sector like in any other sector in a society, the resources are scarce. The challenge for the health care sector is to produce the best health outcomes with the most efficient use of resources. As a consequence of the change in demand for health care in the population, several reforms have been implemented to increase efficiency and activity of health care services during the recent years. The reforms that have been implemented over the years have influenced both the demand and supply of health personnel (Sæther, 2005).

In June 1997, activity based financing was introduced in Norwegian hospitals. Activity based financing is a system based on DRG (Diagnosis related groups) credits and became a part of the block-grant financing system. The aim of the new financing system was to increase the activity and to make a better allocation of resources. A few years later in 2001, free hospital choice was introduced. Free hospital choice gives patients the opportunity to choose which hospital to be treated in and is only applicable for non-acute treatment. The main aim of this reform was to achieve a better allocation of resources (Askildsen & Brekke 2001).

The 1st of January 2002 the Central government took over the responsibility of all public hospitals in Norway. Some of the intention of the reform was to do something about the long waiting lists for elective treatment and the lack of financial responsibility. After years with high deficits in the health care sector, the central government wanted to take the full and formal responsibility (Hagen & Kaarbø, 2004).

In the same period as these reforms were implemented in the health care sector, several other trends and reforms initiatives have emerged. Since the 1990s there has been several family policy reforms that have entered the labour marked and imprinted the time allocation among men and women (Bø et al., 2008). Some of these reforms were the working time reforms in

1996 and 2003 that gave the hospital physicians a better basic wage and the employer an increased flexibility in working time and working time arrangements.

In the labour supply of physicians the “normal” pattern has been to work extra hours in the main job and having a second position or an evening practice. Physicians have a tradition for long working hours and dedication to their profession, but this seems to be a shifting trend (Sæther, 2005). The patterns among younger physicians in Scandinavia has been shifting from long hours of work towards more family life and leisure (Sørensen et al, 2003) There also seems to be a trend among physicians to work more part time, especially among general practitioners where the majority are women (Elliott, 2003)

Physicians in Norway do claim that they to a greater extend do more practical work which earlier was done by other health personnel, and it seems that physicians today spend more time on non-patient related work, like meetings, reporting, coding etc. This might be one of the effects of the several reforms which have taken place over the years (Aasland, 2006).

Several studies have indicated that physicians spend less of their time on direct patient related work and that the productivity in work has decreased. This has lead to an increased attention on how the physician resources are administered and organized (Røhme & Kjekshus, 2001).

In this thesis I will look at the time allocation and labour supply among hospital physicians, before and after the hospital reform of 2002 based on data material from two surveys done in 2001 and 2006. I have following two research questions:

1) *Are there any changes in labour supply among hospital physicians from 2001 to 2006? I.e has hospital physicians increased or decreased their supply of working hours in this period?*

2) *Are there any changes in the composition of this labour supply among physicians in this period? Or more specifically, do the physicians spend more or less of their working hours on patient related work?*

In order to see if there have been any changes I will to look at different factors that can contribute to describe the working patterns among physicians. The physicians` allocation of working time is modelled by several sets of independent variables in this thesis: (i) year, (ii)

gender, (iii) marital status, (iv) present physician position, (v) specialist approval, (vi) Present hospital ward, and (vii) Regional health enterprises.

1.2 Background

The shifting working patterns among physicians seem to be a result of organizational changes as well as shifting trends. The medical work force and the working patterns are not only changing in Scandinavia but also in other Western countries. Studies show that the average hours of work have decreased among physicians both in Canada, Australia and USA. Some of the explanations of these changes in labour supply can be explained by the aging workforce among physicians, the increasing number of female physicians who works part time, and changes in the work preferences among younger physicians (Crossley et al, 2009)

It seems to be a variation in time allocation among physicians. This may be due to the difference in work quantity at different wards in hospitals, numbers of physician specialities, leadership or the division of tasks. The working hours among physicians in Norway are relatively shorter than compared to other Western physicians. Even though the workweeks are shorter here in Norway, the Norwegian health care system scores high on international ratings of health care (Midttun, 2007).

The literature on labour supply and behaviour of physicians holding jobs at hospitals is scarce (Baltagi et al., 2005). There has been an increasing interest in studying the economic behaviour in high-income individuals over the years. When studying high-income groups and labour supply, physicians has been of particular interest, because physicians are among the highest paid professional in the economy and their characteristics and work behaviour might say something about the high-income individuals in general (Showalter & Thurston, 1996).

1.3 Theories/Models

Labour supply is decided by the number of hours a particular population desires to work in exchange for wages, and the number of working hours determines the individual labour

supply curve (Stiglitz & Walsh, 2002). This thesis is focusing on the labour supply in the physician market. Individuals have different tastes over non working time and consumption that can not be controlled for, and these unobservable factors can among other things be expected working hours, workload or challenges at work. These characteristics will in some cases determine the labour supply (Sæther, 2005)

Physicians are working long hours, and this might be due to economic incentives or other attributes of the job. One way of estimating the economic incentives on the physicians labour supply, is to see the effects of the increased wages on the total working hours.

The health care sector consists of many principal -agent relationships. The agency relationship is characterised by a principal and agent, that both wants to maximize their independent utility functions. Because of their diversity of interests and asymmetric information, the principal has to create a contract with the agent. The principal wants to motivate the agent to do what benefits the principal and this can be done by compensation rules or incentives. One incentive for the principal will be to attract the agent with higher payments. For the agent, the outcome will be a result of the payment (Mooney et al, 1993)

The Norwegian health insurance system might give to high demand for health care services because of the low individual share and weak incentive to preventive effort. Solution to this is to increase the individual share or decrease the supply (Bjørvatn et al., 2002)

If the information of the composition of patients is private, the people funding of the State will have limited information over the real composition of patients. Can the people funding trust the hospitals when they say they need more money? Does the low productivity reflect more high risk patients or lower efficiency at the hospital (Mcguire, 2000)

To get the budget in balance, the producer will have incentives to focus on reducing quality and selection to save money. The combination might give better incentives to through optimal production. Higher individual grants might clear away some of the people that do not need that much health care. People with great need in health care can be people with limited revenue, which can be a problem if the individual grants increase (Bjørvatn, et al 2002).

If the insurer faces a hard budget constraint that cannot count on subsidies to cover financial losses, then an insurer who consistently attracts patients that are higher on risk than expected

will eventually go bankrupt, leaving its customers without cover. This can in theory not happen with the Norwegian health funding. The central government can not stop giving reimbursement to the health regions and the hospitals, and let people die (Mcguire, 2000).

1.4 Material and method

The data material in this thesis is based on second handed data and is collected from two surveys conducted in 2001 and 2006 on randomly collected public hospital physicians by the physician register.

The aim of the survey in 2001 was for the physicians to evaluate the effects of the Activity Based Payment system (ABF) in Hospitals, the comprehension of ABF and to analyse possible effects of other alternatives. Besides collecting data about ABF, other conditions like management and organizing, purchase of services abroad, physicians working time and information about their wages was collected.

In survey the survey of 2006, the physicians were asked to evaluate the situation in 2006 with the situation before the hospital reform of 2002, and consider if the reform had achieved any of its goal.

In 2001, the number of collected physicians was 2100, and after the second reminder the total respondents was 1131. This gives a total response rate on 54 %, but the response rate is down to 41 % on some of the questions. In 2006, 2500 physicians received the survey, where 1298 of the physicians responded after the first reminder. This gives a response rate on 53 %.

The two data files have been merged together in one data file and I have compared the same questions that were used in both surveys. It is not known if the dataset is controlled for errors. There might be some imperfection in the data as people comprehend the data differently.

From the dataset I will use the dependent variables as the share of patient related work and total working hours to see if there have been any changes in the labour supply among physicians after the hospital reform. The characteristics of the physicians are presented descriptively and are used as independent variables.

2. The Norwegian Health Care System

2.1 The organizational structure

The organizational structure of the Norwegian health care system is built on the principle of equal access to health care services. The health care sector in Norway and in Scandinavia are in general characterised as a decentralized NHS (National Health Service)-model. The funding is tax based, the actors mainly public, and the local and county government have important roles in decision making. With the implementation of the hospital reform in 2002, the Norwegian health care system changed from a decentralized to semi-centralized NHS (Hagen & Kaarbø, 2004).

The hospital sector in Norway is characterized by restricted competition, in the sense that it has a limited number of hospitals in the marked and stringent establishment terms. The health care system has anyway been drawn to a more market based solutions like activity based financing and free choice of hospital (Askildsen & Brekke, 2001).

In the period, 1970-2001, Norway was divided into nineteen counties that were responsible for the planning and operations of the local hospital sector (including somatic and psychiatric institutions) and other specialized medical services. The exception was the two highly specialized hospitals, the National Hospital (Rikshospitalet) and The Norwegian Radium Hospital (Radiumhospitalet) that already were owned by the central government. In 1974, the nineteen counties were divided into five regional health enterprises (RHE), that obtained the organizational unit for coordination and steering, and each RHE got a University hospital. In 2002 the central government took over the ownership and the responsibility of all public hospitals in Norway (Hagen & Kaarbø, 2004).

2.1.1 The hospital reform of 2002

The 1st of January 2002, the central government took over the responsibility of all public hospitals in Norway, including both somatic and psychiatric hospitals and other parts of specialist care (Hagen & Kaarbø, 2004).

Some of the intention of the reform was to do something about the long waiting lists for elective treatment, lack of equity in the supply of hospital services and the lack of financial responsibility. After years with high deficits in the health care sector, the central government wanted to take the full and formal responsibility. The hospital reform was intended to increase the efficiency and to give patients a better proposition of specialist health care services. This could be done by making the specialist health care more efficient and to give patients a more equal treatment all over the country (Hagen & Kaarbø, 2004).

In 2002, the central government took over the responsibility of the five health region that was established in 1974, and called them regional health enterprises (RHE). All the hospitals within RHE were named health enterprises and became legal objects with responsibilities for personnel as well as capital (Hagen & Kaarbøe, 2004). In June the 1st in 2007, Health Enterprise South and East were merged together as one Health Enterprise.

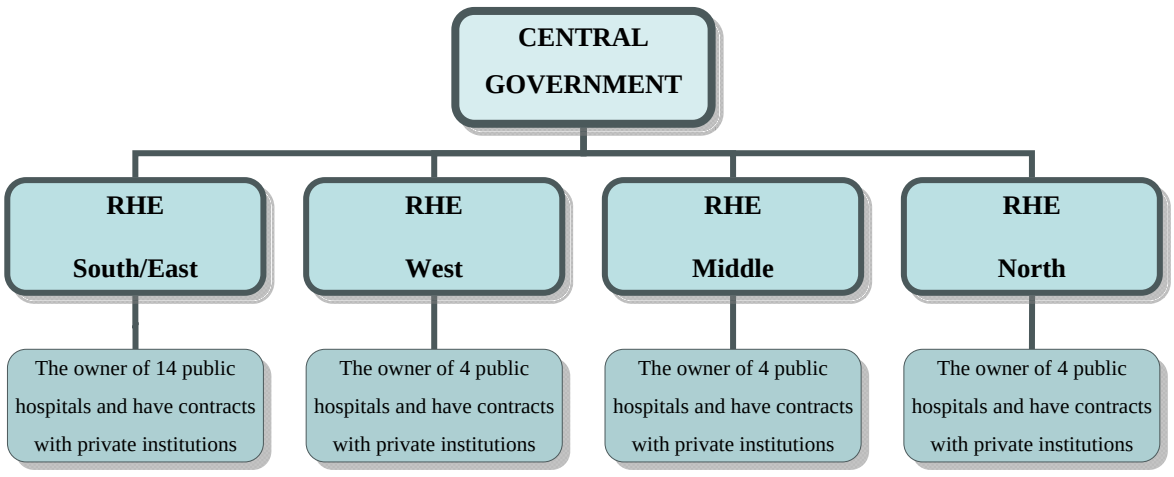

Figure 2.1- The four regional health enterprises anno 2007

In the Western world the health care expenditures have expanded during the years without a corresponding increase in the productivity. This was also the tendency in the Norwegian

health system, and made a need for new ways of organizing hospitals and the health care services, to increase the control and efficiency (Kjekshus, 2003).

With inspiration by the New Public Management (NPM) model, the hospital reform made a new way of organizing and managing hospitals. The aim of the NPM model is to increase the efficiency within the public sector and to increase the central governments control on the public sector. Public institutions like hospitals started using this model to increase the efficiency and create a freedom of choice for the citizens. The NPM model has been criticised and has its many issues. By using the NPM model in the hospital sector means more inequality in the admission to health services, more focus on profitable patients, less democratic control and more expenditure to the public (Eilertsen, 2003).

When implementing the hospital reform, the central government changed the ownership and the structure, but not the financing system. Even though the ownership structure had changed, it did not give the hospitals incentives to change their behaviour. The central government wanted to place a weak discipline on the budget on the regional health enterprise itself, so that the incentive to keep the budget would increase (Tjerbo & Hagen, 2005).

2.2 The Norwegian financing system

People that are liable to pay tax in Norway, pay through an obligatory tax system that contributes to the social insurance that pays physicians and hospitals for health production. In some cases, patients have to pay a small amount for consultations to the physician or at the hospital, but the cost is mainly covered by the public and/or the private insurance company. The Norwegian health system is basically public but some of the health system is based on private solutions, like dental health care (Askildsen & Brekke, 2001).

There are two types of financing systems, *prospective* and *retrospective* financing. In a *retrospective* payments system the provider costs are fully reimbursed ex post. In this system the hospital will reimburse its cost from a third party. In a *prospective* payment system the provider payments rates or budgets are determined ex ante. This means that the hospitals are paid a fixed price per treatment, with an estimated cost based on Diagnosis Related Group (Askildsen & Brekke, 2001).

Since the 1970`s, several financing reforms has been introduced in the hospitals. In 1970 to 1979, the hospitals implemented a financing system ("kurpengefinansiering") based on a fixed price per patient for each day in hospital. In 1980 the block grant system was introduced, based on capitation system. The capitation system puts a price on the head of every member in the population in proportion to the composition and age structure. The block grant system, with a fixed transfer, did not give any incentives to increase the production. To increase the incentives towards a more efficient production, the Activity Based Financing (ABF) was introduced in 1997. The financing system in Norway consists of 60 % block grants and 40% ABF. The ABF give incentives to increase the income in the hospitals, because in contrast to block grant financing, the ABF are dependent on the activity level (Bjørvatn et al., 2002).

2.2.1 Introduction of the Activity Based Financing system (ABF)

The 1st of July 1997, activity based payment system was introduced in every somatic hospital in Norway. ABF is a unit price system where the central government reimburse a share in accordance to the DRG system. DRG is based on a classification system where the price is designed on an average cost per treatment and the payments vary with the patients diagnose (Askildsen & Brekke, 2001).

In the ABF system there are elements of competition that force the hospitals to be more cost efficient. The efficient hospitals get rewarded with their surplus, while the inefficient hospitals with their deficits are forced to be more efficient (Askildsen & Brekke, 2001).

With ABF the hospitals carries all the risk with high risk patients. The activity based financing gives incentives to select low risk patients instead of high risk patients (Bjørvatn et al., 2002).

The ABF give the hospital incentives to increase the patient treatments but it can also give an increased attention towards treating profitable patients. High powered prospective payment system, as ABF, increase efficiency, but may generate quality problems due to *creaming, skimping* and *dumping* (Askildsen & Brekke, 2001). According to Ellis (1998) people with more serious diseases are more expensive and demand more care (Ellis, 1998). If the payment system does not reimburse these fully costs, the hospitals might select away the high risk patients. While a retrospective payment system alone will offer the patients

more treatment than necessary, the prospective payment system may lead to *cream skimming*, by treating the profitable patients. By not giving optimal treatment for the expensive patients, this is due to something called *skimping.* If it is possible to reject patients, some of the expensive patients will not get any treatment at all this is called *dumping* (Askildsen & Brekke, 2001).

The ABF contributed to an increase in hospital activities and reduced the waiting lists, but other factors as demographic change, technological development and an increase in wealth were also influencing (Sæther, 2005)

Free choice of hospital

Since the introduction of ABF, there has been an increase in the number of patients treated and a reduction in waiting time (Hagen & Kaarbø, 2004). This might also be an effect due to the free choice of hospital that was introduced in January 2001. With free choice of hospital all non-acute patients got the possibility to choose which hospital to be treated in, in Norway, hence the resource utilization was maximized. Since the price do not influence the patients` choice of hospital, other factors like distance to the hospital and family, waiting time and the quality of health services might influence the choice (Askildsen & Brekke, 2001).

Free choice of hospital and activity based financing contribute to a competition about patients among hospitals. In the hospital market we have “imperfect” competition with a limited number of hospitals and public regulations, which limits the establishment of new hospitals. Through ABF, the hospitals revenue is partly depended on number of treatments. To make this a situation of competition, the patients must get the information about the possibility of choosing hospital, and relevant information of potential hospitals (Askildsen & Brekke, 2001).

2.2.2 Family policy reforms

Several family policy reforms has entered the labour marked and imprinted the time allocation among men and women (Bø et al., 2008).

An implementation of working time reforms took place in 1996 and 2003, due to the lack of capacity among hospital physicians, long waiting lists of patients and vacant positions among health personnel. The working time reform in 1996 increased the working hours among physicians and the number of patient treatments. The reform of 2003 was based on the hospital reform in the year before, and increased the real wages of the physicians` and the flexibility in working time and working environment. The physician wages was characterised with a low basic wage and a big number of variable increments. A part of the wages that was related to inconvenient working time was now added in the basic wage. The basic wage increased by 2.5 hours per week, and the payment for working overtime and voluntary expanded overtime were reduced. The reform ensured that the physicians got a minimum wage that corresponded to the actually time they are working (The Norwegian Medical Association, 28.07.2005).

The employers can enter voluntary contracts about expanded working time with the physicians. The system of voluntary contracts opens the possibility for individual variations in the physician wages and working time conditions, but it has to be agreed on between the Norwegian Medical Association and the employer (The Norwegian Medical Association, 2005, 28.07.2005).

2.3 Physician labour supply

The characteristics about the medical profession are long working hours, and a sacrifice for the patient welfare above personal needs and family responsibilities. This characteristic still exists, although it may vary between specialities (Gjerberg, 2003). Long hours of work may be due to economic incentives or other attributes of the job. The attributes may be shift work, the possibility for maternity leave, workload, the challenge at work etc. This is characteristics that may determine the labour supply (Sæther, 2005).

The labour market in Norway is characterized with centralized negotiations and powerful unions. Most of the physicians in Norway are represented by The Norwegian Medical Association (The Norwegian Medical Association, 2009)

There seems to be tendency towards a change in working behaviour among physicians. This pattern is not only a case in Norway, but also a tendency in other parts of the world. The

average working hours has been decreasing in Canada, Australia and USA. The change in working hours may be attributed to an aging workforce among physicians, an increasing number of female physicians (more part time work), and different work preferences of younger physicians (Crossley et al., 2009) A decrease in labour supply can also be explained by the early retirement among physicians (Elliott, 2003).

The changing work preferences might also be due to the fact that both male and female physicians today have spouses that have full-time careers, which create a set of family time constraints compared to earlier periods when the physician male was the only source of the household income. This will contribute to a decrease in physician labour supply (Crossley et al., 2009).

There has been an increase in female physicians in the last decades. Still the women are underrepresented in the medical hierarchy and in the most prestigious specialties. The effect of gender on career pattern and family, do varies between specialities. In hospital based specialities it seems that men and women have similar career patterns. This can be due to organizational and structural circumstances and that work at hospitals implies long working hours that can be unpredictable, being on call and the scarcity of part time work (Gjerberg, 2003).

The scarcity of health personnel have been a constant problem for the central government over the years and the most important instrument towards this has been to increase the education capacity. The number of student places at medical school increased rapidly during the 1990s. Today, Norway is the country in the top coat when it comes to physician density (Aasland, 2006). In the period 2001-2006, the number of physicians increased by approximately 18.14 %, but this has not resulted in a growth in the activity (SSB, 2007). This should support the assumption on the demand side that the physicians has the possibilities to choose a job that combines a preferred set working hours and other attributes (Sæther, 2005).

2001	2002	2003	2004	2005	2006
7242	*7291*	*7592*	*7922*	*8199*	*8412*

Table 2-2- Physician man labour year in somatic hospitals in Norway in the period 2001-2006 (SSB 2007)

Despite an increase in the physician density in Norway there is still a number of vacant physician positions. One of the policy goals with NHS is to strengthen the physician services in health sectors in need and in the outskirts. Increased wages is a way to attract the physicians to work more. Many physicians have a second job in other hospitals or in evening practices. An increase in the public wage might influence the number of hours worked in the second job (Sæther, 2005).

Compared to countries as Finland, Denmark and Germany, Norway has the highest health expenditure per inhabitant, the second highest physician coverage, but the lowest productivity. Compared to Finland, Norway has 42 % higher physician density. Despite the lower density in Finland, they also conscripted 79 % more patients than Norway. With a given activity level it seems that an increase in the doctor coverage might result in lower productivity. One of the reasons for this might be the differences in the composition of health personnel (Deloitte, 2008).

The hospitals in Norway have long working shifts for physicians, and physicians can report that they are exhausted and concerned about the safety of their patients, but it seems to be an unacceptable culture for physicians to complain about being tired, because this is seen as disloyal (Hafstad, 2007).

The Working Environment Act in Norway is going to make sure that all employees are having an acceptable working environment. Physicians are an exception from some of these determinations, especially when it concerns working time. According to regulations in the Working Environment Act, people shall not work more than 9 hours during 24 hours or increase above 40 hours per week. The physicians on the other hand, are able to work maximum 19 hours on every duty and maximum 60 hours per week. It can not be required that physicians have to work 38 to 40 hours per week, but most of them do so (The Medical Association, 2007).

3. THEORETICAL FRAMEWORK

3.1 Labour supply theory

The analysis of the labour supply of an individual can be measured by two dimensions, the decision to work or not, and how much or how many hours you want to work if participating in the labour market (Stiglitz & Walsh, 2002).

The decision about how much labour to supply is a choice between income and leisure, or consumption. Leisure can be defined as all the time an individual could potentially work and get paid, but instead is spending on non-work activities. When a person is giving up leisure and decides to work more, the person would receive more income and at the same time be able to increase its consumption. By working less and give up some consumption, a person will obtain more leisure. There are many ways in which people can influence how much labour they will supply. People have the flexibility in choosing a job that allows he/her to work the number of hours he/she wishes. In labour supply decisions, there are also trade-offs between consumptions and leisure, and trade-offs reflects opportunity costs. Opportunity cost of leisure is the forgone consumption that must be given up, and the opportunity cost depends on the wage you can get (Stiglitz & Walsh, 2002).

The reason for the long working hours among physicians might be the economic incentives or other attributes of the job. It can be unobservable attributes that is affecting the labour supply, or characteristic attributes as working shifts, the possibility for maternity leave, expected working hours, workload, and challenge at work and so on (Sæther, 2005)

The literature on labour supply and behaviour of physicians holding jobs at hospitals is scarce (Baltagi et al., 2005). There has been an increasing interest in studying the economic behaviour in high-income individuals over the years. When studying high-income groups and labour supply, physicians has been of particular interest, because physicians are among the highest paid professional in the economy, their characteristics and work behaviour might say something about the high-income individuals in general (Showalter & Thurstone, 1996).

Since physicians belong to a high-income group, the question is if the there is a positive labour supply response to wage increases, or if the income effect dominates the substitution effect (Baltagi et al., 2005).

We expect that people wants to maximize their utility. The satisfaction that consumers gets from having goods is usually called utility. The utility function of an individual depends on which goods that is consumed and the amount of that good. If a person wants to choose between two goods, in this case of wage and leisure, the utility function will be like in figure 3.1. The utility function do illustrate that the marginal utility of a good is decreasing.

Utility function: U = f (X1+X2)

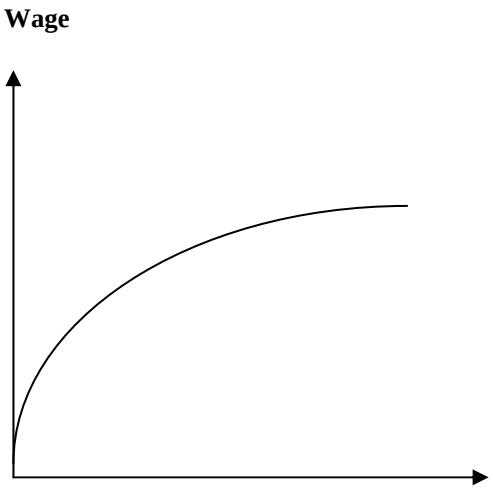

Figure 3.1- Utility curve

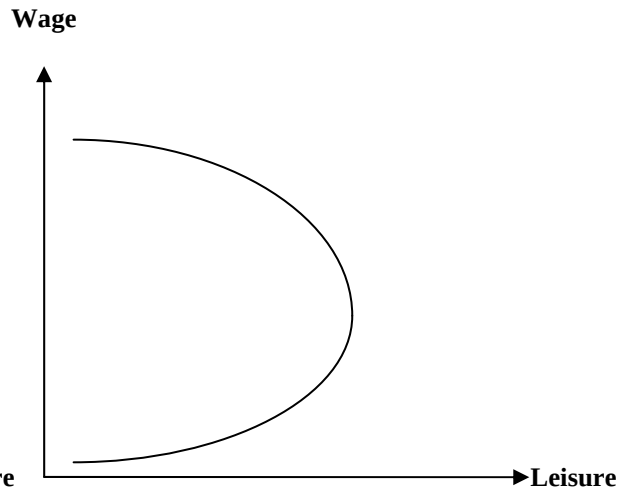

Figure 3.2- Backward bending supply curve

In labour supply theory the labour supply curve may slope downward or bend backward. If the curve bends backward (see figure 3.2) the explanation will be that the income effect dominates the substitution effect, meaning that a higher wage may result in a decrease in working time. A possibility of a backward bending supply curve in labour supply can be created by the opposing forces on income and substitution effects. The backward bending labour supply curve assumes that when a wage increase, then at a certain point the working hours will begin to decrease (Stiglitz &Walsh 2002).

The focus on the marked of physicians has mainly been on the supply side, but there are also important aspects on the demand side that are disregarded. The vacant positions among physicians should support the assumption that it is few restrictions on the demand side, and

it is possible for the physicians to find the preferred combination of job and working hours. It is assumed that physicians makes choices about their labour supply from a finite set of job possibilities characterized by practice form, hours and wage rates (Sæther, 2005) This can be illustrated by an indifference curve where the combination of the good of working hours and leisure are indifferent to an indifference curve. An individual has the same utility along the indifference curve (See figure 3.3).

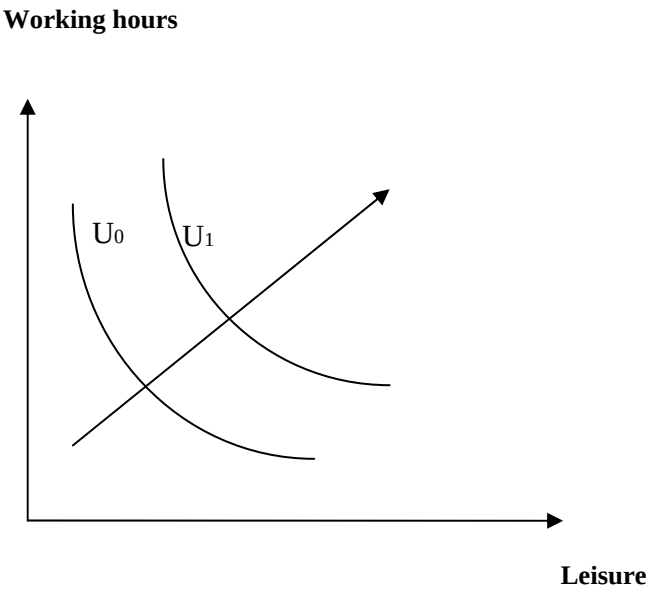

Figure 3.3- Indifference curve

The change in wages has an *income*- and a *substitution effect*. When the wages increase, a person is better off and will purchase more of all goods. This is called the income effect. If a person is willing to give up some of these good, like leisure and to work more, the person can get more of other goods. This is called the substitution effect (Stiglitz & Walsh 2002).

The wage changes will be unaffected if the income- and substitution effect balance each other. When the substitution effect dominates, people will work more as the wages increase and trade off leisure for more income. This will give a normal case of an upward sloping labour supply curve. Another effect can be seen at high income wages. An increase in high income wages will outweigh the substitution effect, so that the labour effect decreases. This may be the case among high income professionals, like physicians, and result in a backward bending labour supply curve. According to the backward bending labour supply curve, people will work more until they reach a certain point where the labour supply decreases. People will then value leisure more and work less (Stiglitz & Walsh 2002).

To get health personnel to work in areas with special needs and accept jobs that have disadvantageous hours of work, like night work, then wage and other fees is seen as important. Since wages are the dominated cost, the health authorities in many countries tries to control this by influencing the health personnel`s choice of specialization, practice type and working hours (Sæther, 2005)

In studies done on female labour supply, there is indicated that women that participating in the working life is responsive to changes in the wage rate, unearned income, the spouse`s income, marital status and having small children. According to a survey done by Killingsworth and Heckman (1986), the labour supply elasticities for females are positive, meaning that they are responding to a wage increase (Sæther, 2005).

3.2 Principal-agent theory

The Norwegian health care sector consists of a complicated network of principal- agent relations. In the principal-agent relationship, the principal engage another person(s) which become the agent, to perform a task on the behalf of the principal. There are number of principal-agent problems in the health care sector due to asymmetric information, moral hazard or adverse selection. In a principal-agent relationship the asymmetric information plays a great part. With asymmetric information, the agent has more information about the performance than the principal. One of the courses of action is to increase the control over the physicians (Smith et al., 1997).

In a principal-agent relationship in the health care sector the participants can have different goals about how to allocate the resources. There are a number of possible ways of action towards the principal-agent problem in health care (Smith et al., 1997)

ABF and free choice of hospital established a marked based system and competition in the health care sector. The health care system in Norway is influenced by the New Public Management model, which lead to a more marked based system (Askildsen & Brekke, 2001).The ABF give economic incentives to increase the patient treatments, at the same time this may lead to cream skimming where the hospital choose to treat the most profitable patients (NOU, 1999)

With the introduction of the working time reform of 2003, it reduced hours of planned overtime. The incentive of the central government was to reduce the working hours of the physicians and reduce costs. This restriction did not reduce the possibility for the physicians to work more, since the physicians are free to combine their work at the hospital with a private practice. Another economic incentive for the physician to have a second job as private practice, is the possibility to deduct their practice related expenses from their wages in proportion to taxation (Sæther, 2005)

Reducing costs was not the only incentive by the health authorities when introducing the ABF, but also to increase the efficiency and to reduce the waiting lists. There are a lot of challenges according to this. The health authorities must delegate responsibility to other regimes, as hospitals (agents) that will act on the behalf of the government (principal). The government demands about high cost efficiency might be against the health workers view about satisfying care, treatment or personal preferences. The waiting lists can be a way for the hospitals to show the government, that they need more money to be able to treat the patients in line. When the central government (principal) do not have the full information about the situation of the hospital (agent), the central government do not know whether the bad results are a result of missing action from the hospital, or if there are things the hospital can not control. This is a situation the agent can exploit against the principal and are due to asymmetric information problem (Askildsen & Brekke, 2001)

Shift work has a documented negative impact on workers health and social life, effects that are compensated with higher wages and shorter working hours. If the hospital wants to attract the marginal worker by a wage increase, the hospital must also increase the wages of all physicians at the hospital. The factors that determine the earnings of the physicians are the formal qualifications, seniority and working hours. How many hours that a physician works in a week depend on the shift plan that the physicians share (Sæther, 2005). An increase in wages may result in less working hours. With the working time reform of 2003, the physicians got an increase in the real wages and the overtime payments were reduced. Increase in wages and more emphasize on real wages, might give the physicians an incentive to work less.

A critical question in the principal-agent theory is how well the principal can observe the behaviour of the agent. The principal wants to give the agent incentives to make more effort,

but in order for this to occur, the agent must bear the risk. The agent is willing to bear the risk if he/she compensated for it, with higher income. The optimal contract is risk sharing between the principal and agent (Douma & Schreuder, 2002).

Wages and fees are considered to be important in motivating people to work undesirable hours. In most countries the health authorities try to influence the behaviour of health personnel in choice of specialization, practice type and working hours. This can be done by regulations through quotas and are widely used in countries with National health services (NHS). Regulations in the quotas in medical school are an example of increasing the physician capacity in Norway. With deregulation of health systems, wage incentives seem to be important in implementing health policies. Wages is the most central policy variable used in NHS when implementing human resource. To understand the behaviour mechanism behind the change in wages related to the number of working hours is complicated. When estimating the impact of wage changes in the decision of labour supply, the tax schedule must be taken into consideration. The difficulties in measuring the tax schedule is that the individuals has different tastes in non-working time and consumption that cannot be controlled for (Sæther, 2005)

3.2.1 Litterature search

Since the literature on this topic is scarce, I have used Linda Midttun`s article “Medical specialists` allocation of working time” as a basis for searching for appropriate literature.

Beside using some of the literature in Midttun`s article, I have used Google Scholar, PubMed, the Norwegian Medical Association`s homepage and the Physician Research Institute. I have also used different syllabus from my study. The most important words I have searched for were “labour supply” , “labour supply among physicians”, “time allocation among physicians”, “working time among physicians”, “physicians in Norway”, “Incentives in the health care sector” , “working time reforms”. The same search was done with Norwegian words as well.

3.2.2 Literature review

According to several international studies the time allocation and labour supply among of general practitioners and medical specialists are related to factors as reimbursements system, patient demand and supply characteristics (Midttun, 2007).

Killingworth (1988) notes that researchers have found factors as individual taste and that preferences have important effects on labour supply behaviour. Personal preferences may be captured through the physicians` self-reported preference for patient related work, administrative and research/educational tasks (Killingsworth, 1988) According to Midttun (2007) the physicians who are working in the public sector allocates more of their time to administrative and research/educational tasks. There have also been found that physicians that are working the fewest hours allocate time more proportionally to activities such as patient care than those who are working longer hours (Midttun, 2007).

Time allocation of work may be different depending on type of physician speciality or position. In a time-mapping study performed in a maternity hospital and a medical ward in Trondheim, the results are showing great variation in time allocation among the physicians and that the working day for a physician varies a lot (Røhme & Kjekshus, 2001).

There are said that physicians spend less time on patient related work than before. One of the reasons for this can be due to more detailed documentation in patient journals, which is very time-demanding for the physicians. The increasing demand for clinical and administrative documentation may lead to a decrease in patient related care. A study done in a hospital in Austria, reports that almost the same amount of time is spent on documentation as on direct patient care. The increasing need for documentation can harm the quality of the patient care. The Medical Association in Austria estimates that physicians do not spend more than 63% of their time on direct patient care (Ammenwerth et al, 2009)

How physicians are allocating their work might also be affected by medical experience (age) and gender. With regards to gender, studies have shown that female physicians spend longer overall time on patient care. Older physicians normally have longer medical experience and will therefore be recruited to higher positions that spend more time on administrative and managerial duty, and less on direct patient related work (Midttun, 2007).

In the work paper of Sæther (2005), one of the concluding remarks is that high income group with full participation and many hours worked during a year is not responsive to wage increase in their total labour supply. Baltagi et al (2005) finds that physicians that work at hospital behave similarly to other employees and that the wage elasticities are positive, meaning that physicians do respond to a wage increase. The hospital physicians are among the high-income group in the population, but Baltagi et al (2005) means that they do not have to be anywhere near the backward-bending part of the supply curve.

In the working paper of Sæther (2005) there is a limited response in the total labour supply to a wage increase in the literature for the physicians (Sæther, 2005).

Studies done by Feenberg and Poterba (1993), and Feldstein (1995) on tax effect on labour supply for physicians, report that high income individuals are responding to incentives, but that the exact response to it is unclear. Other studies have not found such an effect for the high-income group (Sæther, 2005).

3.2.3 Hypothesis

In my two main hypothesis I want to test if the total working time have increased or decreased from 2001 to 2006, and how the share of the total working time is related to patient related work among hospital physicians in the same period. In addition to these two hypothesis I want to test if there are any difference in time allocation among different hospital wards.

Hypothesis 1: There has been a reduction in the total working time among physicians, due to a general trend in the society in valuing more leisure and family life

There seems to be a tendency and a trend among people today to value more leisure and less working hours. Although physicians have traditions for long working hours they seem to follow the same tendency, especially the younger physicians. With the working time reform in 2003, the physician got a wage increase. Both an increase in wages and in the real wages will result in less working hours, and we may assume that when high-income individuals increase their wages they will choose to work less. This might lead to an effect as in backward bending supply curve. The wage increase for the physicians implied an increase in the real wage and a decrease in the over time payments. If the payments are given per hour,

people will choose to work more than with a fixed payment then they will no longer have the same economic incentive to work more. Hence, according to these assumptions I assume that there has been a reduction in working time from 2001 to 2006.

Hypothesis 2: The hospital physicians allocate less time on patient related work and more time on administrative work due to an increased bureaucracy by the hospital reform of 2002

In the second hypothesis I will look at the share of patient related work among physicians. With the implementation of the hospital reform the hospital became more bureaucratized, and required more non-patient related assignments as clinical documentation, meeting, coding etc than before. This obliges the physicians to allocate less time on other assignments, as patient related work. Although it seems that physicians might allocate less time on patient related work, this assumption can also pull in the other direction. There have been an increase in newly qualified physicians over the past years, and with this increased capacity in man-labour years, more patient related work can be performed. Since there have been an increased bureaucracy and an increased documentation, I assume that there has been a reduction in patient related work.

Hypothesis 3: There is a significant difference in time allocation among physicians working at different hospital wards.

In the last hypothesis I want to see if there is any difference in how the physicians allocate their working time among different activities (patient related work, administrative work, research/education and other activities) in different hospital ward. Internal organising and personal preferences of the hospital physicians are assumed to influence how they allocate their work. Midttun (2007) indicate that field of speciality can be related in to time allocation, and that personal preferences on patient related work is positively associated with the time spent on that assignment. Time spent on other assignments is negatively associated with this preference. From these findings I assume that there are differences in time allocation in my sample of hospital physicians (Midttun, 2007).

4. RESEARCH METHODOLOGY

4.1 Method

The data used in the analysis are second handed data, and is based on two different surveys done in respectively 2001 and 2006 . In the first survey in 2001, physicians were asked to give an evaluation on the activity based financing system of 1997, and in the second survey, the physicians were asked to evaluate the hospital reform of 2002. This is done by using the statistic method multivariate regression in SPSS.

4.2 Analysis

In this thesis I have used to analysis, an univariate and a linear regression analysis.

Univariate analysis

The Univariate analysis gives the frequency distribution on all the variables included in the analysis, both independent and dependent variables. These are listed in the chapter of descriptive statistics.

Linear regression

The linear regression analysis examines the linear relationship between a dependent and one independent variable. The linear regression estimates the effects the dependent variable has on an independent variable. Regression assumes that the dependent variables are normally distributed. Non-normally distributed variables can distort the relationship and the significance tests, and contribute to type I and type II errors.

Standard multiple regression can only estimate the relationship between dependent and independent variables if the relationship are linear. If the relationship between the dependent and independent variable is not linear, the results of the regression will under estimate the true relationship. In a multivariate regression this non-linearity will increase the risk for type

I error, hence an over estimation. A multivariate regression makes it possible to test more than one variable and get a more complete explanation on the dependent variable. The dependent variable is often a result on several factors.

4.3 Sample characteristics

The two surveys are based on randomly collected public, hospital physicians by the Physician register. The total number of hospital physicians responding on the surveys was; n=1112 (2001) and n=1298 (2006). Among the respondents, 78 of the physicians were omitted from the analyses because of lack of data on allocation of working time between different assignments and general missing data on relevant variables. This give the total sample of 2332 physicians: n=1074 (2001) and n=1258 (2006).

I have used the information about the characteristics of the physicians` from both surveys. The following characteristics are age, gender, marital status, number of children caring for, present position, present ward at the hospital, specialist approval, the number of gross wages in the main- and second job, and regional health enterprise. The gross wages are the only variable that is not used in the analysis, but is annotated through the thesis anyway. For a detailed description of all variables used in the estimation, this can be found in appendix 2.

I will by a multivariate regression, use the characteristics about the physicians to control for the effect in total working hours and allocation of patient related care in 2001 and 2006. All the physicians are made anonymous, and no hospitals will be used in the analysis part, as I do not find it relevant in search for my research questions. I have used the RHE instead which gives a broader scope of the sample. An overview of the hospitals responded on the surveys can be found in appendix 1.

In search for any changes in the labour supply of physicians in the period 2001 and 2006, following dependent variables have been used:

i. *The total working hours among physicians in an average working week*

ii. *The total hours spent on direct patient related work and other specific assignments in an average working week*

4.4 The questionnaires

The two questionnaires used in 2001 and 2006 did not have the same design, but some of the same questions were used in both. The survey from 2001 was based on the effects of the activity based financing system and the survey from 2006 was based on the effects of the hospital reform. In this thesis, only the identical questions were used in the analysis.

The respond rate on the survey in 2001 was 54% and some of the questions were down to 41% response. In 2006, the respond rate was 53 %. The numbers of the respond rate in both years, is considered to be high when take into consideration that the physicians are the target population. Refer to Midttun`s article (2007).

On the front page of the questionnaires the respondents got information about the reason for this survey, based on some information about the particular reform, the financing partners, the randomization of the sample, information about confidentiality, what the data will be used for, the approximately time it takes for filling out and a name of a person to contact if there are any questions regarding the questionnaires.

In the surveys the hospital physicians were asked to state how many hours they worked at the hospital in an average week and to specify how these hours were allocated on different assignments listed in table 4.1. These are my main variables. Some of the assignments have been merged together into categories. Assignments as meeting, management and personnel administration, administrative medical work, and telephone/electronic communication have been grouped into the category “administration”. Research and teaching has also been grouped into one category. Patient related work is the only assignment that has its own category.

Categories of work within the hospital
Categories of work: 1) **Direct and indirect patient related work** 2) **Adminstrative work** *Meetings* *Management and personnel administration* *Administrative medical work (journaling, epicrisis writing, DRG coding, archiving, prescriptions, various certificates)* *Telephone and electronic communication beyond patient related work* 3) **Research** 4) **Teaching/training** 5) **Other activities** 6) The average number of working hours within the hospital in a week

Table 4.1- Categories of different assignments within the hospital

5. Descriptive statistics

In this chapter I will present the frequency data in 2001 and 2006, on age, gender, marital status, present care of children, present position, hospital ward, specialist approval and regional health enterprises. The frequency of the physician characteristics, are represented in following tables, 5.1, 5.2 and 5.3, but only the characteristics in 5.1 and 5.2 are used in the analysis.

	2001	**2006**	**Total (2001-2006)**
Gender	**Frequency (%)**	**Frequency (%)**	
Men	779 (72,9 %)	814 (66,6 %)	1593 (69,5 %)
Women	290 (27,1 %)	408 (33,4 %)	698 (30,5 %)
Missing	*5*	*36*	*41*
Total	1069	1222	2291
Age			
20-29	35 (3,3 %)	52 (4,2 %)	87 (3,8 %)
30-39	326 (30,5 %)	404 (32,9 %)	730 (31,8)
40-49	335 (31,3 %)	344 (28 %)	679 (29,5 %)
50-59	267 (25 %)	267 (21,7 %)	534 (23,2 %)
60-69	106 (9,9 %)	159 (12,9 %)	265 (11,5 %)
70 or more	1 (0,1 %)	2 (0,2 %)	3 (0,1 %)
Missing	*4*	*30*	*34*
Total	1070	1228	2298
Marital status			
Unmarried/singel	78 (7,3 %)	99 (8,1 %)	177 (7,7 %)
Married/cohabitant	911 (85,3 %)	1046 (85,2 %)	1957 (85,3%)
Divorced/separated	70 (6,6 %)	73 (5,9 %)	143 (6,2 %)
Widow(er)	9 (0,8 %)	8 (0,7 %)	17 (0,7 %)
Missing	*6*	*32*	*38*
Total	1068	1226	2294
Children			
0	395 (37,1 %)	465 (38,2 %)	860 (37,7 %)
1	164 (15,4 %)	199 (16,3 %)	363 (15,9%)
2	292 (27,4 %)	316 (25,9 %)	608 (26,6 %)
3	165 (15,5 %)	178 (14,6 %)	343 (15 %)
4	45 (4,2 %)	45 (3,7 %)	90 (3,9 %)
5	4 (0,4 %)	14 (1,1 %)	18 (0,8 %)
6	0 (0 %)	1 (0,1 %)	1 (0 %)
7	1 (0,1 %)	0 (0 %)	1 (0 %)
Missing	8	40	48
Total	1066	1218	2284

Table 5.1- Distribution of gender, age and marital status

As illustrated in table 5.1, the gender distribution in the 2001 and 2006 is skewed. The majority of the hospital physicians responded on the two surveys is men. This is not

surprising when we know that the majority of physicians in Norway are men. The number of respondents increased for both genders from 2001 to 2006. The male respondents increased approximately by 4% and the female respondents increased by almost 30%. The high increase among female physicians can be a sporadic effect or an effect on the increase of female physicians in the last years.

The distribution in the responsiveness is lower in the younger age groups (20-29) and highest in the middle age groups (30-50), and decreases with the higher age groups (60-70+). These numbers are to be expected when considering that becoming a specialist takes 5 years after finishing medical school therefore it is logic that it is few respondents in the lowest age group. The decrease in the higher age groups might be due reasons as retirement. The age groups are also higher in 2006, and this might explain the higher frequency in higher positions. The category “others” is not specified.

The majority of the physicians in the two surveys are married or have a cohabitant. The number of the marital status is also increasing from 2001 and 2006. This can also be an effect of the increasing age in the groups responding in 2006.

The average number of children, caring and control for is almost the same in both years.

	2001 (total)	2006 (total)		
Present position	**Frequency (%)**	**Frequency (%)**	**Men**	**Women**
Unit Chief Physician /Clinic Chief	164 (19,1 %)	271 (22,2 %)	341	93
Section Chief Physician	155 (18 %)	525 (43 %)	492	183
Chief Physician	296 (34,4 %)	163 (13,4 %)	321	137
Consultant Chief Physician	232 (27 %)	99 (8,1 %)	191	139
Other	13 (1,5 %)	162 (13,3 %)	95	79
Missing	*214*	*38*	*153*	*67*
Total	860	1220	1440	631
Different hospital wards				
Ophthalmology	21 (2,6 %)	27 (2,2 %)	30	18
Otorhinolaryngology	29 (3,6 %)	34 (2,8 %)	50	12
Surgical ward	96 (11,8 %)	162 (13,3 %)	204	54
Orthopaedics	59 (7,3 %)	67 (5,5 %)	109	16
Neurological ward	40 (4,9 %)	64 (5,3 %)	56	48
Laboratory	40 (4,9 %)	72 (5,9 %)	70	41
Anaesthesiology	82 (10,1 %)	123 (10,1 %)	166	39
Medical ward	189 (23,3 %)	261 (21,4 %)	333	116
Radiotherapy department	52 (6,4 %)	92 (7,6 %)	85	58
Obstetrics/gynaecology	54 (6,7 %)	89 (7,3 %)	82	61
Other hospital ward	149 (18,4 %)	227 (18,6 %)	230	142
Missing	*263*	*40*		
Total	811	1218	1415	605
Specialist approval	743 (69,4 %)	797 (66,3 %)		
Yes	*3*	*55*	1163	369
No	743	797	410	322
Region (RHE)				
Region 1 – South	459	406	584	267
Region 2 – East	156	332	347	131
Region 3 – West	184	247	293	131
Region 4 – Middle	153	146	198	92
Region 5 – North	91	123	143	71
Total	1043	1254	1565	692

Table 5.2- Distribution on position, hospital ward, specialist approval and region

The distribution of physicians in different positions is skewed both in category year and gender. One of the reasons for this might be the higher respondents in 2006 than in 2001, higher missing data in 2001, and the fact that men are the majority. The age groups are higher in 2006, and this might also explain the higher frequency in higher positions. The total respondents with speciality approvals have had modest increase.

The distribution of physicians in different hospital wards in 2001 and 2006, are a little bit skewed in the surgical ward, medical ward, and among physicians working in other wards. This m ay be due to a higher missing rate in 2001 and the higher number of total respondents in 2006.

	Within **2001**	Within **2006**	Outside **2001**	Outside **2006**
Gross Wages	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**
0-150 000 NOK	6 (0,6%)	6 (0,5%)	716 (67,4%)	1570 (83,2%)
150 000-299 000 NOK	26 (2,5 %)	15 (1,2 %)	240 (22,6 %)	61 (6,1 %)
300 000-449 000 NOK	169 (15,9 %)	78 (6,3 %)	67 (6,3 %)	22 (2,2 %)
450 000-599 000 NOK	351 (33,1 %)	292 (23,5 %)	19 (1,8 %)	21 (2,1 %)
600 000-749 000 NOK	349 (32,9 %)	368 (29,6 %)	7 (0,7 %)	20 (2,0 %)
750 000-899 000 NOK	137 (12,9 %)	293 (23,6 %)	7 (0,7 %)	27 (2,7 %)
900 000-1100 000 NOK	20 (1,9 %)	160 (12,9 %)	5 (0,5 %)	14 (1,4 %)
>1 100 000 NOK	3 (0,3 %)	30 (7,8 %)	1 (0,1 %)	4 (0,4 %)
Total responded	1061	1242	1062	1003
Missing	*13*	*16*	*12*	

Table 5.3- Gross wages in the main job at the hospital and in the second job outside the hospital

The data on the gross wages represent the wages in the year before the survey was done, i.e. 2000 and 2005. The total respondents do not differ that much, and the missing data is low. When comparing the data on wages within the hospital, it has decreased in the lower categories in 2006, but increased in the higher wage categories. This might has something to do with the increase in the real wages for the physicians in 2003. Another reason for this wage increase might be that there are more physicians in higher positions in 2006 than 2001. Higher positions will have a higher wage. In table 6.3, we can see that the total working hours has decreased by approximately 0.5 hour in 2006. This might be an modest effect of the working time reform or just a coincidence.

6. Labour supply

Hypothesis: There has been a reduction in the total working time among physicians, due to a general trend in the society in valuing more leisure and family life

6.1 Total working hours

The labour supply of an individual may depend on whether to work or not, and how many hours a person prefer to work. How many hours a person prefers to work, may vary through life depending on many factors.

A multi regression analysis is performed on the time allocation among hospital physicians in 2001 and 2006. The independent variables, treated as dummies, are year (2006 as reference), age (40-49 as reference), gender (woman as reference), position (Unit Chief/Clinic Chief as reference), specialist approval No specialist approval as reference), marital status (widow as reference), hospital ward (Radiotherapy ward as reference) and Region (North as reference) to see if they have any effects on the total working time. The dependent variable in this analysis is total working time among the physicians. The descriptive statistics for this analysis is represented in table 5.21 and 5.2.The results from the multivariate regression are reported in table 6.2.

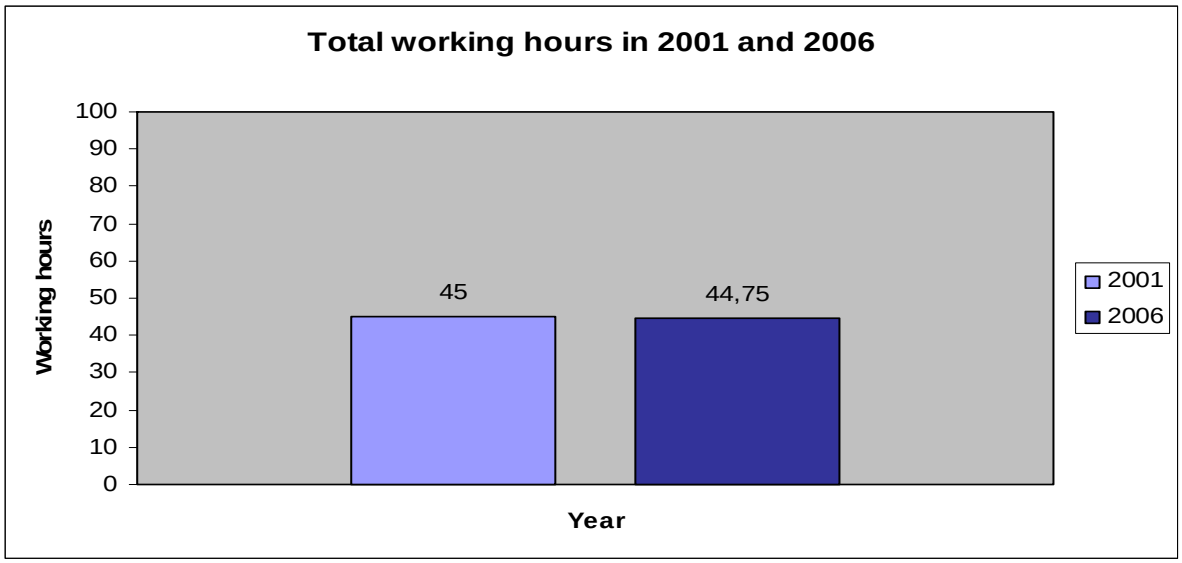

Figure: 6-1- Total working hours in 2001 and 2006

Variables	B	Std.error	Sig
Constant	43.474	2.660	.000
Year	1.006	.435	.021
Gender	.819	.409	.046
Age 20-29	1.459	1.127	.196
Age 30-39	.938	.594	.115
Age 50-59	.981	.543	.071
Age 60-69	-1.393	.718	.053
Age 70 or more	-2.815	5.463	.606
Section Chief Physician	-2.544	.516	.000
Chief Physician	-2.680	.640	.000
Consultant Chief Physician	-4.086	.876	.000
Other position	-2.936	.909	.001
Speciality approval	1.160	.679	.088
Ophthalmology	-1.948	1.326	.142
Otorhinolaryngology	-3.096	1.181	.009
Surgical ward	3.397	.813	.000
Orthopaedics	4.319	.963	.000
Neurological ward	.390	1.007	.699
Laboratory	.418	.989	.673
Anaesthesiology	1.045	.851	.219
Medical ward	1.412	.750	.060
Obstetrics/gynaecology	1.239	.919	.177
Other hospital ward	.739	.765	.335
Number of children	-.276	.170	.105
Region 1	-1.984	.641	.002
Region 2	-1.114	.689	.106
Region 3	-1.865	.699	.008
Region 4	-1.703	.753	.024
Unmarried/singel	2.579	2.535	.309
Married/cohabitant	2.566	2.444	.294
Divorced/separated	.935	2.529	.712

Table 6.2- A multivariate regression on total working hours in 2001 and 2006

Dependent variable: Total working hours

Reference categories: Year 2006, women, Age-40-49, Unit Chief Physician/Clinic Chief, no Specialist approval, Radiotherapy ward, Region 5, divorced

The regression equation:

$$Working\ time = \beta_0 + \beta_2 * Year + \beta_3 * gender + \beta_4 * age + \beta_5 * position + \beta_6 * specialist\ approval + \beta_7 * hospital\ ward + \beta_8 * number\ of\ children + \beta_9 * Region + \beta_{10} * Marital\ status$$

The adjusted R-square is 0.07 and tells us that 7 % of the variation in the share of total working hours is explained by variations in the independent variables.

In table 6.2 we can see the effects of the independent variables listed in column B which is the unstandardized regression coefficients that examine the average change in total working hours when value of the independent variables increases with one unit.

The variables in the regression that are significant (at a 0.05 sig.level) with total hours of work, are year, gender, position , Otorhinolaryngology ward, Surgical ward, Orthopaedics, Region 1, 3 and Region 4.

From the regression in table 6.2 we can see that the bivariate effect is less than the controlled effect in total working hours (see figure 6.1). This indicates that there are other factors that influence the working time. From the regression (table 6.2) we can see that the physicians have reduced their working time by approximately 1 hour from 2001 to 2006.

The Unit Chief/Clinic Chief worked significantly more than the other positions. The explanation for this difference might be that higher positions are often correlated with more working hours.When controlling for different wards, with the Radiotherapy ward as the reference category, Otorhinolaryngology ward works significantly fewer hours than the Radiotherapy ward, and the Surgical and the Orthopaedics ward works significantly more. This may be due to coincidences or it may be differences between the different hospital wards.From the variable Region we can see that all the Regions are working less than Region 5 (North), but only Region 1 (South), Region 3 (West), Region 4 (Middle) is working significantly fewer hours than Region 5.

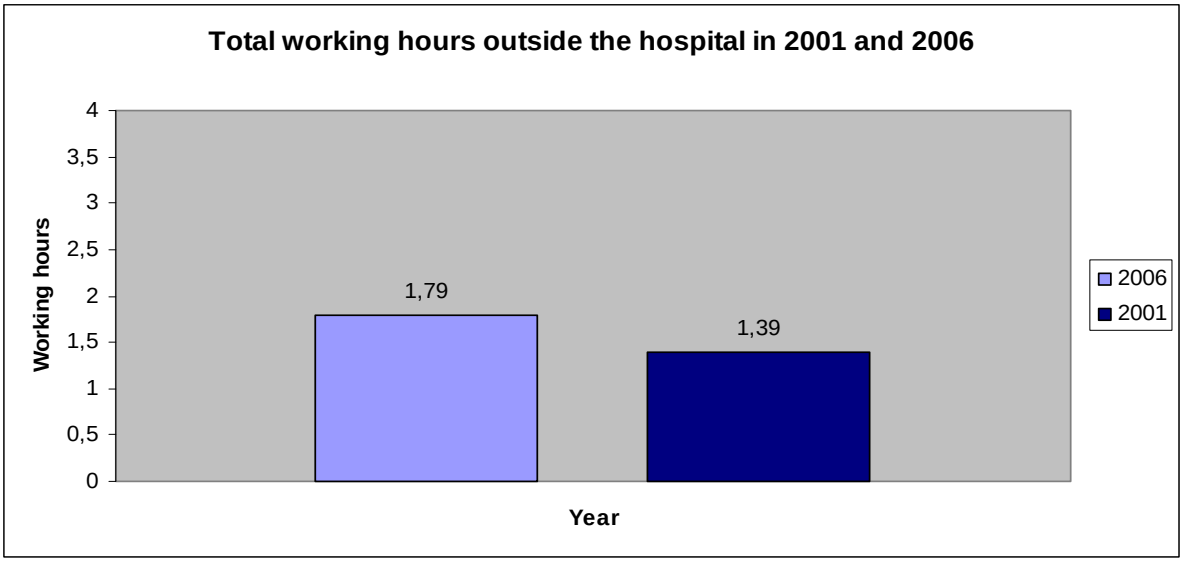

Figure 6.3- Total working hours outside the hospital in 2001 and 2006

7. Patient related work

Hypothesis: The hospital physicians allocate less time on patient related work and more time on administrative work, due to an increased bureaucracy by the hospital reform of 2002

7.1 The total hours of patient related work

I have used a multivariate regression analysis to test the hypothesis. The total share of patient related work is presented in appendix 1 and in figure 7-1. The descriptive statistics for this analysis is represented in table 5.1 and 5.2.

The dependent variable in this analysis is the share of patient related work, and the independent variables are that are treated as dummies are year (2006 as reference), age (with 40-49 as reference), gender (women as reference), marital status (widow as reference), present position (Unit Chief/Clinic Chief as reference), specialist approval (no specialist approval as reference), Region (with Region 5 as reference).

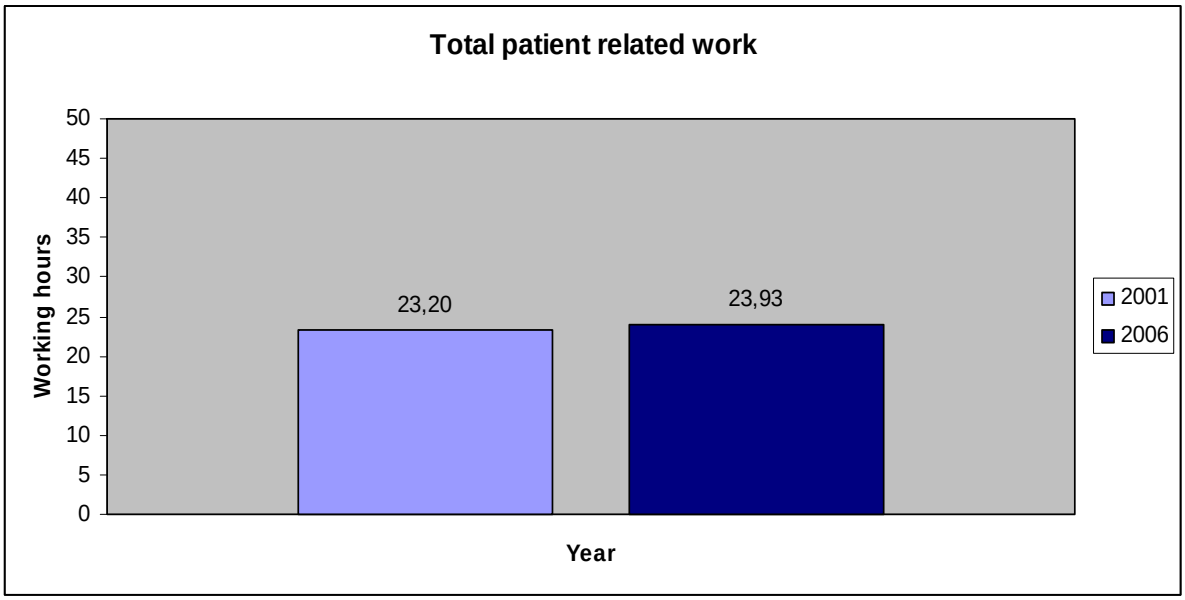

Figure 7-1 Total patient related work in hospitals in the period 2001 and 2006

Variables	B	Std.error	Sig
Constant	49.624	6.471	.000
Year	-3.161	1.068	.003
Gender	-2.504	1.009	.013
Age 20-29	1.815	2.748	.509
Age 30-39	1.660	1.458	.255
Age 50-59	.960	1.333	.472
Age 60-69	1.308	1.765	.459
Age 70 or more	21.259	13.276	.109
Section Chief Physician	11.561	1.271	.000
Chief Physician	13.453	1.570	.000
Consultant Chief Physician	11.182	2.144	.000
Other position	10.243	2.222	.000
Speciality approval	-.253	1.660	.879
Ophthalmology	-13.608	3.265	.000
Otorhinolaryngology	-12.722	2.908	.000
Surgical ward	-22.552	2.015	.000
Orthopaedics	-20.437	2.374	.000
Neurological ward	-28.717	2.478	.000
Laboratory	-23.990	2.446	.000
Anaesthesiology	-9.003	2.106	.000
Medical ward	-26.657	1.857	.000
Obstetrics/gynaecology	-19.517	2.270	.000
Other hospital ward	-26.639	1.894	.000
Number of children	.550	.419	.190
Region 1	-.069	1.572	.965
Region 2	.339	1.691	.841
Region 3	.036	1.722	.983
Region 4	1.966	1.842	.286
Unmarried/singel	17.741	6.161	.004
Married/cohabitant	15.991	5.939	.007
Divorced/separated	13.334	6.152	.030

Table 7.2- Multivariate regression on patient related work

Dependent variable: Share of patient related work

Reference categories: Year 2006, women, Age-40-49, Unit Chief Physician/Clinic Chief, No speciality approval, Radiotherapy ward, Region 5, Divorced

The regression equation for this analysis is:

*The total share of patient related work = = β_0 + β_2 * Year + β_3 * gender + β_4 * age + β_5 * position + β_6 * specialist approval + β_7 * hospital ward + β_8 * number of children + β_9 * Region + β_{10} * Marital status*

The adjusted R-square is 0,206 tells us that 20.6 % of the variation in the share of patient related work is explained by the variations in the independent variables.

The regression results show that the physicians worked approximately 3% less with patient related work in 2001 than in 2006. In figure 7.3, when not taking the total share into consideration, we can see there is a modest increase in patient related work by approximately 1 hour.

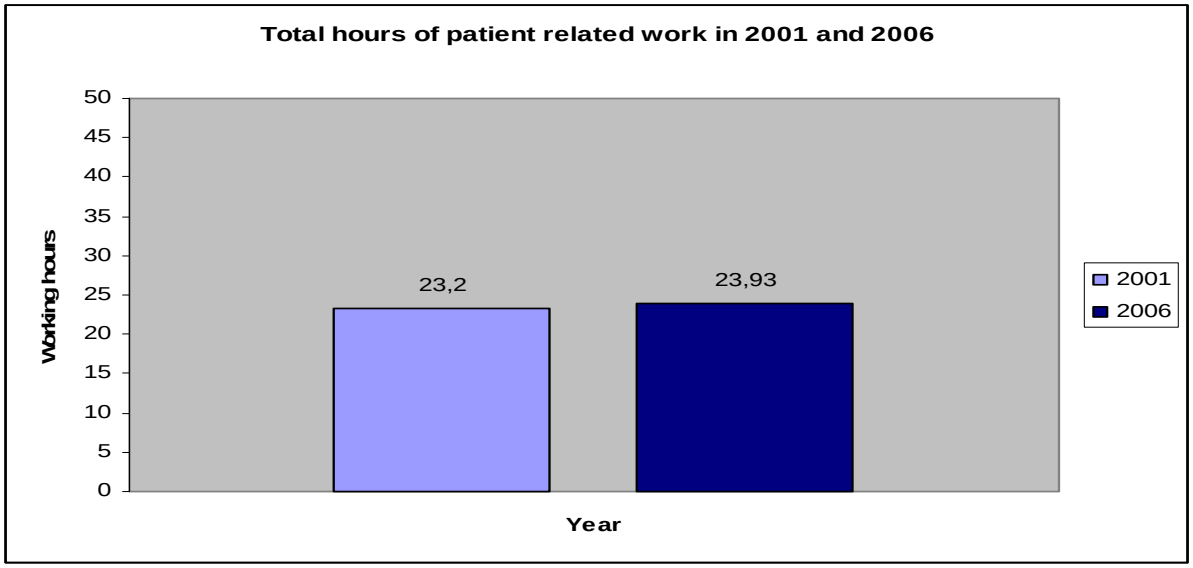

Figure 7.3- Total working hours of patient related work in 2001 and 2006

We can also see from analysis that it is a significant difference in gender. Men are on average working 2 % less on patient related work than women.

In the analysis we can see that the Radiotherapy ward do work significantly more with patient related work than the other wards. This indicates that the allocation of working time varies between different wards.

When it comes to marital status the reference category widow(er) are working fewer hours than those with status as divorced/separated, married/cohabitant or unmarried. The explanation for this might be that people that are widows often become this in a higher age and higher age correlate with higher positions (often do so). This makes sense when we look at the variable, present position. Unit Chief/Clinic Chief are allocating significantly less time on patient related work than the other position. The explanation for this might be that the

Unit Chief/Clinic Chief is working with more administrative tasks than the other positions and not so much in the clinic.

There are been claimed that the physicians today spend more time on non-patient related work, due to increasing administrative work which might have been an effect due to the hospital reform. In this analysis we can see that hospital physicians worked 3% less with patient related assignments in 2001 than 2006. This indicates that the hospital reform did not have that strong negative effect on the allocation of patient related work after all.

Hypothesis

Hypothesis: There is a significant difference in time allocation among physicians working at different hospital wards.

The total hours worked in different hospital wards, can be found in table the multivariate regression in table 6.2.The regression indicates that there are significant differences in total working hours between some of the wards when using Radiotherapy as the reference category.

To see if there is any significant difference in time allocation between the different hospital wards, a multivariate regression are done with four dependent variables; (i) patient related work, (ii) administrative work, (iii) research/education and (iiii) other work. The independent variables used are year (dummies), age, gender, speciality approval (dummies), position, marital status, hospital ward (dummies) and region. The different activities are grouped into categories of work, see 4.1 and descriptive statistics can be found in appendix 2.

In table 4.1, we can see there is a difference in time allocation between different hospital wards. There are specially three wards that stands out from the other wards in allocation of working time, and that is the Radiotherapy ward, the Neurological ward and the Laboratory ward. On average, the Radiotherapy ward are spending the most time on patient related work compared with the other wards, but is also the ward that spends less time on administrative, research/education and other activities. The Neurological ward is spending the most time on administrative work and the fewest hours on patient related work. The Laboratory ward does

allocate less of the time on research/teaching and the most of the time on other activities. This seems to the tendency in both 2001 and 2006.

Variables	B	Std.error	Sig
Constant	33,08	1,861	0
Ophthalmology	-6,494	1,638	0
Otorhinolaryngology	-7,661	1,456	0
Surgical ward	-7,798	1,005	0
Orthopaedics	-6,408	1,186	0
Neurological ward	-12,129	1,238	0
Laboratory	-10,784	1,214	0
Anaesthesiology	-3,346	1,049	0,001
Medical ward	-10,846	0,924	0
Obstetrics/gynaecology	-7,725	1,134	0
Other hospital ward	-11,007	0,946	0
Year	-1,007	0,457	0,028
Gender	-0,651	0,497	0,191
Speciality approval	1,323	0,719	0,066
Age	-0,42	0,279	0,133
Marital status	-1,345	0,546	0,014
Position	0,86	0,269	0,001
Region	0,252	0,160	0,115

Table 7.3- Regression on direct patient related work

Dependent variable: Direct patient related work

Reference category: Radiotherapy ward

The regression equation:

$$\textit{Direct patient related care} = \beta_0 + \beta_1 * \textit{hospital ward} + \beta_3 * \textit{Year} + \beta_4 * \textit{Gender} + \beta_5 * \textit{Specialist approval} + \beta_6 * \textit{Age} + \beta_7 * \textit{Marital status} + \beta_8 * \textit{Position} + \beta_9 * \textit{Region}$$

The adjusted R-square is 0,125 and tells us that 12.5 % of the variation in the share of patient related work is explained by variations in the independent variables.

In table 7.3, a multivariate regression analyses is done on allocation on patient related work between different hospital wards. All the hospitals wards are allocating significantly less hours than the Radiotherapy ward. We can see that marital status and present position is significant in allocating patient related work. When controlling for the independent variable year, it also gave significant effects. It was allocated 1 hour less direct patient related work in 2001.

Variables	B	Std.error	Sig
Constant	16,746	2,008	0
Ophthalmology	4,742	1,666	0,004
Otorhinolaryngology	6,286	1,631	0
Surgical ward	10,422	1,114	0
Orthopaedics	9,974	1,304	0
Neurological ward	11,998	1,352	0
Laboratory	6,597	1,324	0
Anaesthesiology	5,019	1,184	0
Medical ward	11,476	1,038	0
Obstetrics/gynaecology	8,799	1,233	0
Other hospital ward	10,835	1,067	0
Year	2,061	0,479	0
Gender	0,445	0,523	0,395
Speciality approval	-3,176	0,771	0
Age	-0,089	0,3	0,767
Marital status	-0,436	0,569	0,444
Position	-2,439	0,288	0
Region	-0,117	0,169	0,488

Table 7.4- Regression on administrative work

Dependent variable: Administrative work

Reference category: Radiotherapy ward

The regression equation:

Administrative work: $\beta_0 + \beta_1$ * *hospital ward* $+ \beta_3$ * *Year* $+ \beta_4$ * *Gender* $+ \beta_5$ * *Specialist approval* $+ \beta_6$ * *Age* $+ \beta_7$ * *Marital status* $+ \beta_8$ * *Position* $+ \beta_9$ * *Region*

The adjusted R-square is 0,151 tells us that 15.1 % of the variation in the share of patient related work is explained by variations in the independent variables.

In table 7.4, all the hospitals in the analysis are allocating more hours on administrative work than the Radiotherapy ward, with significant results. The variable year, specialist approval and present position also give significant results. It was allocated 2 hours more on administrative work in 2001.

Variables	B	Std.error	Sig
Constant	-0,815	1,126	0,469
Ophthalmology	0,218	0,965	0,821
Otorhinolaryngology	0,571	0,881	0,517
Surgical ward	1,254	0,603	0,038
Orthopaedics	1,373	0,71	0,053
Neurological ward	1,822	0,756	0,016
Laboratory	3,461	0,741	0
Anaesthesiology	0,73	0,64	0,255
Medical ward	1,539	0,558	0,006
Obstetrics/gynaecology	0,975	0,684	0,154
Other hospital ward	1,351	0,572	0,018
Year	-0,38	0,274	0,166
Gender	0,732	0,296	0,014
Speciality approval	1,873	0,433	0
Age	0,034	0,17	0,844
Marital status	0,335	0,326	0,304
Position	0,23	0,164	0,159
Region	0,019	0,097	0,848

Table 7.5- Regression on research and education

Dependent variable: Research and education

Reference category: Radiotherapy ward

The regression equation:

Research and Education = $\beta_0 + \beta_1$ * *hospital ward* + β_3 * *Year* + β_4 * *Gender* + β_5 * *Specialist approval* + β_6 * *Age* + β_7 * *Marital status* + β_8 * *Position* + β_9 * *Region*

The adjusted R-square is 0,034 tells us that 3.4 % of the variation in the share of patient related work is explained by variations in the independent variables.

In table 7.5, the hospital wards that significantly spend more time on education/research, are the Surgical ward, Neurological ward, Laboratory ward, Medical ward, other wards. There are no significant differences when controlled for year

Variables	B	Std.error	Sig
Constant	-0,821	0,617	0,184
Ophthalmology	0,645	0,543	0,235
Otorhinolaryngology	0,491	0,483	0,309
Surgical ward	0,389	0,333	0,243
Orthopaedics	0,514	0,393	0,191
Neurological ward	0,359	0,41	0,382
Laboratory	2,527	0,402	0
Anaesthesiology	0,58	0,348	0,096
Medical ward	0,362	0,306	0,237
Obstetrics/gynaecology	0,686	0,376	0,068
Other hospital ward	0,607	0,314	0,053
Year	0,377	0,152	0,013
Gender	0,156	0,165	0,343
Speciality approval	0,357	0,238	0,134
Age	0,204	0,093	0,028
Marital status	-0,208	0,181	0,249
Position	0,3	0,089	0,001
Region	0,016	0,053	0,762

Table 7.6- Regression other work assignments

Dependent variable: Other work assignments

Reference category: Radiotherapy ward

The regression equation:

*Other work activities = β_0 + β_1 * hospital ward + β_3 * Year + β_4 * Gender + β_5 * Specialist approval + β_6 * Age + β_7 * Marital status + β_8 * Position + β_9 * Region*

The adjusted R-square is 0,031 tells us that 3.1 % of the variation in the share of patient related work is explained by variations in the independent variables.

In table 7.6, the allocation of time on other activities was significantly higher in the laboratory ward, in 2001, with increased age and present position when compared to the Radiotherapy ward.

The four regression analysis on time allocation between different hospital wards, indicates that there are differences in how the different hospital wards allocate their work.

8. DISCUSSION

8.1 Hypothesis

The main aim of this study was to see if there have been any changes in working time and patient related work among hospital physicians in the period 2001 and 2006. The hypothesis tested:

i. There has been a reduction in the total working time among physicians, due to a general trend in the society in valuing more leisure and family life

ii. The hospital physicians allocate less time on patient related work and more on administrative work, due to increased bureaucracy by the hospital reform of 2002.

iii. There is a significant difference in time allocation among physicians working at different hospital wards.

8.1.1 Labour supply

It seems to be a shifting trend among younger physicians towards valuing more family life and leisure. Physicians are known for long working hours and dedication to their work, and a normal pattern has been to have a second job in another hospital or in a private practise. Male physicians have been dominating the profession for decades, and developed patterns that are impressed by men.

The changing patterns may also be an effect of the organizational changes in the last decades, due to several reforms that have influenced the labour supply of men and women. The entry of female physicians, are also contributing to change in a rather male dominated profession. It is indicated that female physicians reduce the working hours because of more part time and maternity leaves. Studies have shown that this might be a pattern among female general practitioners, but this seems not to be the case among public female physicians due to long work shifts and on-call commitments.

In the regression on total working hours, we can see that there has been a modest decrease in total working time with approximately 1 hour in 2006.

There also seems to be a gender difference in working time. Men have increased their total working time by approximately 1 hour more than the female physicians in 2006.. This can be random result, or a result of women working more part time. Studies show that female physicians are still more affected by family responsibilities than the male physicians, but in hospital based specialities men and women seems to have the similar career patterns. This can have something to do with the structural/organizational circumstances at the hospital. The gender difference in working time might also be due to the fact that men are the majority sitting in higher positions, and that higher position corresponds with more working hours. As we can see from the results, the Unit Chief/Clinic Chief is the position with the most hours of work, and that the number of working hours decreases with the decreasing positions.

There are also significant differences in working time among different hospital wards. This can be due to the composition of the health personnel within the hospital wards or it may be that different wards require different amount of work. There is also significant differences between the RHE`s. The Region North is working the most, and this might be due to demographic differences in the population or be due to the different wage systems. The hospital physicians in RHE, North, have higher wages than the other physicians in RHE`s (Hagen, 2009) This may be due to the incentive system that seeks to attract physicians in areas that are less attractive and that require more capacity.

Along with the working time reform in 2003, the real wages increased and the overtime payments reduced. When high-income individual get a wage increase they might want to reduce their working time, and this can be due to a backward bending supply. It is not possible to draw any conclusion from my regression about the decrease in total working time, but it might give an indication. In this case, it can be indicated that the wage increase might have played a modest role in the reduction of working time. The decrease in total working time might also be due to the fact that there is a general tendency in the population where people are valuing more leisure than work.

8.1.2 Patient related work

Physicians in Norway do claim that they to greater extend than earlier do more practical work which was earlier done by other health personnel, and they do more of non-patient related work as meetings, coding, reporting etc. This could be one of the effects of the hospital reform. Several studies can report that physicians have decreased their time on patient related assignments and productivity.

Due to the hospital reform there has been an increased bureaucracy in hospitals in proportion to more documentation and administrative work among the physicians. Hence, we would expect less patient related work due to this, but instead there is an opposite tendency. From the result we can see that the physicians are allocating approximate 3% more on patient related work in 2006. This constitutes approximately 1 hour more.

In the regression of patient related work we can see that there is a gender difference, where men are working 2.5 % less than the women. This supports the studies that report that female physicians spend longer overall time on patient care. This may have something to do with the gender distribution in different positions that might affect how the physicians allocate their working time. I assume that it is differences in the workload and in the composition of work between different positions and hospital wards. Men are the majority in higher positions in the analysis. The Unit Chief/Clinic Chiefs are working significantly less with patient related work than the other positions, and are also the position that are working the most of them all. It seems that the relative time spent on administrative work and on research/education assignments, do increase with longer working hours (see Midttun, 2007). This supports the argument that men are represented in higher positions, and along with this, do allocate less time on patient related work. When due to marital status widow(er) spend less time on patient related work than the physicians that are not widows. People usually become a widow(er) in a high age, and with higher age, people usually have more experience and are therefore working in higher positions. As exemplified earlier, with increasing experience and longer working hours, hence the patient related work seems to be reduced.

8.1.3 Time allocation at hospital wards

Differences in time allocation may be due to the difference in the work quantity at different wards in the hospitals, number of physician specialities, leadership or the division of tasks. The regression on time allocation among different ward show a significant differences in especially three wards. The results in this regression, are the much of the same findings explored in Midttun`s (2007) article on time allocation among medical specialists.

The regression indicates that it is a difference in time allocation among the hospital wards. The results show that all the hospital wards (with Radiotherapy as reference) work significantly less hours on patient related assignments than the Radiotherapy ward. The results in table 7.2 illustrates that the hospital wards that allocates the most time on patient related work are the Otorhinolaryngology ward, Anaesthesiology ward and the Radiotherapy ward, when looking at the total share of patient related work. The findings in the regression in table 7.4 show almost the same results apart from the Otorhinolaryngology ward that is replaced by the Orthopaedics ward. Some of these findings are in line with similar studies as in Midttun`s (2007) article in time allocation, apart from the Ophthalmology that was replaced by Otorhinolaryngology and Orthopaedic ward in my results. Midttun (2007) use the variable “medical speciality” instead of hospital ward, but I assume that this will not constitute much difference in the comparison. Midttun also finds that the Ophthalmologists, Anaesthesiologists and Radiologists spend less time on administrative work and research/education and these findings are the same in my results. It seems that with an increase in patient related work there is a decrease in time spent on administrative work, and the other way. An example of this can be seen in time allocation at the Neurological ward, the Medical ward and the category “other hospital wards”. These wards allocate the less time on patient related work, but the most hours in administrative work. This exemplify that it seems to be some stable differences in hospital wards (medical specialities) on time allocation between different assignments.

8.2 Weaknesses

The hospital physicians were given self reported answers in the surveys. The fact that the surveys are based on self reported answers leads to an asymmetric information problem.

This can be a weakness since the physicians may have a self interest in presenting the reality some what different than it is. Hence the self reported information may not be entirely reliable. According to similar studies, it might be under- and over reporting in the answers, so the data material might not be that flawed (Midttun, 2005)

Other factors that might influence the answers are the respondents in the sample. According to the Hawthorne effect, workers that participate in working surveys are more productive than they who do not participate (Røhme & Kjekshus, 2001).

The survey from 2006 asked the physicians to evaluate the hospital reform while the survey from 2001 asked to evaluate the effect of the activity based financing. Due to self interests in physicians, this might have had an affect on the answers.

The data used in this thesis were basically categorical data. This is a disadvantage because we can not see the whole scale of numbers. The use of more numerical data might have been more useful in this thesis, especially when it comes to age and gross wages.

8.3 Strengths

The sample size used in this thesis is representative and the respondents were almost equally distributed in both years. The spread in the dataset is also fairly good. There are some unequal distributions in the independent variables, as in gender and age, but these differences are to be expected.

The respondent rate was above 50 % in both surveys. This is considered as a high number.

8.3.1 Omitted variables/changes

There were some challenges with the dataset at times due to several missing data. There has also been discovered some registration faults in some of the questions on the way. It was several extreme outliers that were excluded. It has also been several faults in summarizing the total working hours per week. The missing data in the category of total hours of work, I had to summarize all the variables on time allocation. The physicians opposed to write number of hours worked in every assignment in the survey even though the number was zero. This was not done several places, so I changed every assignment that was missing into

zero, if rest of the hours allocated in the different assignment corresponded with total working hours.

I have also chosen to omit all the physicians in the data that had not answered on time allocation at all, since total working hours and patient related assignments was my main variable. The omitted physicians also had after all, usually limited answers in almost all the questions.

In the variable of present position, the registration of the data in 2006 was somewhat different than in 2001. The categorical data was coded into 5 categories in both years, but in 2006 the data was registered into 1 - 6. I assumed that since the first category (Unit Chief physician/Clinic Chief) was the only category that had two positions together, it has been coded as 1 and 2 in the dataset. I recoded like this: 1=1, 2=1, 3=2, 4=3, 5=4, 6=5. We can see from the descriptive statistics in table 5.2, that the distribution between the positions in 2001 and 2006 are skewed. This can be due to coincidences or errors.

9. Conclusion

There have been modest changes in working time, with approximately 1 hour decrease in total working hours in 2006, and 1 approximately 1 hour more on patient related work in the same year. It can not be concluded that the hospital reform have had any effect on working hours and time allocation, but there are indications in the study that trends and tendencies towards more family life and leisure are influencing the labour supply among physicians.

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11. APPENDICES

APPENDIX 1: Descriptive statistics

	2001	**2006**
Year- 0:2006; 1:2001		
Share of patient related work	23.20 (9.04)	23.93 (10.67)
Share of administrative work	17.33 (9.01)	16.51 (9.69)
Share of research and education work	3.41 (4.48)	3.57 (6.07)
Share of ”other” work	1.55 (3.45)	1.09 (2.89)
Total working hours	45.00 (6.67)	44.75 (9.04)
Total working hours outside the hospital	1.79 (4.26)	1.39 (5.50)
Gross wage in the main job	4.43 (1.10)	5.15 (1.27)
Gross wage in the physician work beside the main job	1.50 (0.94)	1.49 (1.34)
Gender- 1:male; 0:female	1.27 (0.45)	1.33 (0.47)
Age	3.08 (1.04)	3.07 (1.11)
20-29- 0: other; 1: 20-29	0.03 (0.18)	0.04 (0.20)
30-39- 0: other; 1: 30-39	0.30 (0.46)	0.33 (0.47)
40-49- 0: other; 1: 40-49	0.31 (0.46)	0.28 (0.45)
50-59- 0: other; 1: 50-59	0.25 (0.43)	0.22 (0.41)
60-60- 0: other; 1: 60-69	0.10 (0.30)	0.13 (0.32)
70 or more- 0: other; 1: 70 or more	0.00 (0.03)	0.00 (0.04)
Speciality approval- 0: no; 1: yes	0.69 (0.46)	0.66 (0.47)
Marital status	2.01 (0.42)	1.99 (0.42)
Umarried- 0: other; 1: Unmarried	0.03 (0.18)	0.04 (0.20)
Married/Cohabitant- 0: Other; 1: Married/Cohabitant	0.30 (0.46)	0.33 (0.47)
Divorced/Separated- 0: other; 1: Divorced/Separated	0.31 (0.46)	0.28 (0.45)
Widow(er)- 0: other; 1: Widow(er)	0.25 (0.43)	0.22 (0.41)
Share of children	1.36 (1.27)	1.33 (1.29)
Present position	2.74 (1.10)	2.47 (1.29)
Unit Chief Physician /Clinic chief- 0: other; 1: Unit Chief Physician /Clinic chief	0.19 (0.39)	0.22 (0.42)
Section Chief Physician- 0: other; 1: Section Chief Physician	0.18 (0.38)	0.43 (0.50)
Chief Physician- 0: other; 1: Chief Physician	0.34 (0.48)	0.13 (0.34)
Consultant Physician- 0: other; 1: Consultant Physician	0.27 (0.44)	0.08 (0.27)
Other position- 0: other; 1: Other speciality	0.02 (0.12)	0.13 (0.34)
Present ward	7.12 (2.94)	7.20 (2.92)
Ophthalmology- 0: other; 1: Ophthalmology	0.03 (0.16)	0.02 (0.15)
Otorhinolaryngology - 0: other; 1: Otorhinolaryngology	0.04 (0.19)	0.03 (0.16)
Surgical ward- 0: other; 1: Surgical ward	0.12 (0.32)	0.13 (0.34)
Orthopaedic ward- 0: other; 1: Orthopaedic ward	0.07 (0.26)	0.06 (0.23)
Neurological ward- 0: other; 1: Neurological ward	0.05 (0.22)	0.05 (0.22)
Laboratory- 0: other; 1: Laboratory	0.05 (0.22)	0.06 (0.24)
Anaesthesiology- 0:other; 1: Anaesthesiology	0.10 (0.30)	0.10 (0.30)
Medical ward- 0:other; 1: Medical ward	0.23 (0.42)	0.21 (0.41)
Radiotherapy department- 0:other; 1: Radiotherapy department	0.06 (0.25)	0.08 (0.26)
Obstetrics/gynaecology- 0:other; 1: Obstetrics/gynaecology	0.07 (0.25)	0.07 (0.26)
Other hospital ward- 0: other; 1: Other hospital ward	0.18 (0.39)	0.19 (0.39)
Region	2.29 (1.38)	2.40 (1.31)
1. South- 0: other; 1: south	0.44 (0.50)	0.32 (0.47)

2. East- 0: other; 1: East	0.15 (0.36)	0.26 (0.44)
3. West- 0:other; 1:West	0.18 (0.38)	0.20 (0.40)
4. Middle- 0: other; 1: Middle	0.15 (0.35)	0.12 (0.32)
5. North- 0: other; 1:North	0.09 (0.28)	0.10 (0.30)
Mean values (standard deviation)		

APPENDIX 2: Time allocation in hospital wards

Patient related work	**2001**	**2006**	**Totalt**	**N**
Ophthalmology	25,14 (9,88))	25,83 (8,65)	25,52 (9,13)	47
Otorhinolaryngology	22,10 (5,46)	26,64 (13,06)	24,51 (10,41)	62
Surgical ward	23,80 (8,30)	24,58 (10,24)	24,28 (9,54)	250
Orthopaedics	23,72 (7,62)	26,86 (9,16)	25,39 (8,59)	124
Neurological ward	21,70 (8,15)	18,73 (9,39)	19,89 (9,01)	103
Laboratory	22,85 (11,42)	19,68 (12,28)	20,80 (12,02)	110
Anaesthesiology	27,19 (10,28)	29,02 (11,30)	28,29 (10,92)	203
Medical ward	21,05 (8,00)	21,26 (8,89)	21,17 (8,52)	447
Radiotherapy department	30,42 (11,28)	33,32 (9,66)	32,30 (10,31)	139
Obstetrics/gynaecology	21,96 (7,49)	25,97 (9,73)	24,43 (9,12)	140
Other ward	20,89 (8,34)	20,77 (9,07)	20,82 (8,77)	371
Total (N)	802	1194		1996
Adm.work	**2001**	**2006**	**Total**	**N**
Ophthalmology	11,59 (5,30)	13,98 (6,78)	12,96 (6,24)	40
Otorhinolaryngology	15,54 (8,65)	12,97 (6,44)	14,34 (7,73)	43
Surgical ward	20,56 (15,14)	16,71 (7,95)	18,07 (11,15)	201
Orthopaedics	18,02 (7,85)	18,03 (8,14)	18,03 (7,96)	93
Neurological ward	18,96 (6,93)	19,56 (11,16)	19,34 (9,74)	82
Laboratory	15,98 (9,83)	13,76 (8,27)	14,59 (8,89)	86
Anaesthesiology	13,68 (8,43)	13,03 (10,19)	13,32 (9,41)	144
Medical ward	19,47 (6,39)	19,00 (8,42)	19,20 (7,63)	357
Radiotherapy department	9,30 (8,46)	7,03 (6,74)	7,84 (7,44)	89
Obstetrics/gynaecology	18,44 (8,73)	15,29 (10,78)	16,57 (10,07)	118
Other ward	18,89 (8,00)	18,73 (8,76)	18,79 (8,44)	282
Total (N)	631	904		1535
Research/Education	**2001**	**2006**	**Total**	**N**
Ophthalmology	1,89 (1,44)	2,80 (4,07)	2,39 (3,16)	42
Otorhinolaryngology	2,92 (4,33)	2,82 (5,24)	2,86 (4,81)	54
Surgical ward	3,33 (3,65)	3,72 (5,66)	3,58 (5,01)	227
Orthopaedics	3,77 (4,82)	3,54 (5,18)	3,65 (4,99)	111
Neurological ward	2,51 (2,38)	4,88 (9,26)	3,87 (7,25)	87
Laboratory	6,12 (7,34)	5,57 (6,45)	5,76 (6,75)	93
Anaesthesiology	3,13 (4,55)	2,92 (5,63)	3,00 (5,21)	167
Medical ward	3,48 (4,20)	3,76 (6,5)	3,64 (5,63)	395
Radiotherapy department	3,04 (3,63)	1,57 (1,84)	2,14 (2,76)	119
Obstetrics/gynaecology	3,24 (4,26)	3,26 (6,98)	3,25 (6,01)	124
Other ward	3,52 (4,06)	3,76 (5,86)	3,66 (5,18)	323
Total (N)	715	1027		1742
Other activities	**2001**	**2006**	**Total**	N
Ophthalmology	1,00 (1,41)	1,42 (2,63)	1,23 (2,16)	47
Otorhinolaryngology	1,93 (2,97)	1,00 (2,75)	1,44 (2,87)	62
Surgical ward	1,35 (3,09)	1,02 (2,03)	1,15 (2,48)	250
Orthopaedics	1,59 (2,52)	0,94 (1,69)	1,25 (2,14)	124
Neurological ward	1,35 (2,90)	0,82 (1,77)	1,02 (2,28)	103
Laboratory	2,82 (4,86)	3,26 (6,24)	3,10 (5,77)	110
Anaesthesiology	1,34 (2,92)	1,24 (2,87)	1,28 (2,88)	203
Medical ward	1,3 (4,21)	1,04 (3,28)	1,15 (3,7)	447
Radiotherapy department	1,12 (2,51)	0,41 (0,81)	0,66 (1,65)	139
Obstetrics/gynaecology	2,54 (3,44))	0,65 (1,39)	1,38 (2,56)	140

Other ward	1,85 (3,95)	0,88 (1,72)	1,28 (3,13)	371
Total (N)	415	685		1996

Mean estimates with standard error in parentheses.

APPENDIX 3: Distribution of hospitals

The number of hospitals responding	2001	2006	Total	Total excluded
Sunnaas Sykehus HF	0	8	9	1
St Olavs Hospital	84	69	153	5
Helse Blefjell HF	3	14	17	1
Sykehuset Buskerud HF	30	36	66	4
Akershus Unversitetssykehus	47	54	101	6
Aker Universitetssykehus HF	39	42	81	6
Asker og Bærum sykehus HF	21	31	52	3
Sykehuset Innlandet HF	66	78	144	8
Sykehuset Østfold	37	45	82	9
Ullevål Universitetssykehus HF	112	140	252	9
Helse Stavanger HF	55	66	121	8
Helse Fonna HF	22	31	53	4
Helse Bergen HF	82	121	203	18
Helse Førde HF	18	21	39	1
Helse Sunnmøre HF	4	38	42	2
Helse Nordmøre og Romsdal HF	53	13	66	1
Helse Nord Trøndelag HF	12	24	36	3
Helse Finnmark HF	6	8	14	1
Universitetssykehuset i Norde Norge HF	39	59	98	2
Hålogalandsykehus HF	12	11	23	2
Nordlandssykehuset HF	23	35	58	5
Helgelandssykehuset HF	11	6	17	1
Radium-/Rikshospitalet HF	127	129	256	13
Sørlandet sykehus HF	54	63	117	8
Sykehuset i Vestfold HF	34	43	77	2
Sykehuset i Telemark HF	28	29	57	4
Ringerike sykehus HF	7	10	17	0
Missing	30	4	34	
Total	1056	1224	2285	127

APPENDIX 4: QUESTIONNAIRES

1) How many hours do you allocate in the following activities in the *hospital* in an average working week? Use the last line to sum up the total working time per average week. If you have not allocated any time on the definite activities, write 0.

2) How many hours do you work in paid work employment outside the hospital where you have your main attachment, in an average working week?

3) What was your gross wage from work in the hospital where you have your main attachment in year 2000?

4) What was your gross wage (deduct possible running expences), from physician work outside the hospital in year 2000?

5) Gender?

6) Age?

7) Specialist approval?

8) Marital status?

9) How many children do you have present care for?

10) What is your present position?

11) In what kind of hospital ward are you mainly working at?

APPENDIX 5: CATEGORIES IN THE QUESTIONNAIRES

Question 1
Direct patient related work (with patients or work with tests, pictures etc, on patients)
Meetings (meeting in the morning and other professional meetings)
Leadership- and staff assignments
Administrative work (Journals, epicrices, coding, referral, filing, medical certificates etc)
Telephone and electronic communication beyond patient related work
Research
Education/teaching
Other
Total hours worked in an average working week

Question 2
The total hours worked outside the hospital in an average working week

Question 3
Less than 150 000 NOK
150 000-299 000 NOK
300 000- 449 000 NOK
450 000-599 000 NOK
600 000-749 000 NOK
750 000- 899 000 NOK
900 000-1 100 000 NOK
1 100 000 or more

Question 4
Less than 150 000 NOK
150 000-299 000 NOK
300 000- 449 000 NOK
450 000-599 000 NOK
600 000-749 000 NOK
750 000- 899 000 NOK
900 000-1 100 000 NOK
1 100 000 or more

Question 5
Man or woman

Question 6
20-29
30-39
40-49

50-59
60-69
70 or more

Question 7
Yes or no

Question 8
Unmarried
Married/Cohabitant
Divorced/Separated
Widow(er)

Question 10
Unit Chief Physician /Clinic chief
Section Chief Physician
Chief Physician
Consultant Physician
Other

Question 11
Ophthalmology
Otorhinolaryngology
Surgical ward
Orthopaedics
Neurological ward
Laboratory
Anaesthesiology
Medical ward
Radiotherapy department
Obstetrics/gynaecology
Other speciality